

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/14/09 has been entered.

### ***Response to Amendment***

2. Amendment filed 12/14/09 together with said request for Continued Examination forms the basis for this Office action. In said Amendment applicant filed Amendments to the Claims, including substantial amendments to claims 1-8, 10-13, 16 and 18-21 and the addition of new claim 24, and Remarks. Claims 3, 4, 6 and 7 remain withdrawn. Comments in response to said remarks are included below under "Response to Arguments".

### ***Specification***

3. The Specification is objected to for providing incorrect velocities corresponding to the energies of the neutrons emitted in the process for which the target is intended. See page 22. The velocities are too low by nine (9) orders of magnitude. Appropriate correction should be made.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. **Claims 1, 2, 5, 8, 10-13, 16, 18-21 and 24** are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for bombardment with ions, does not reasonably provide enablement for the claim that the neutron emissive parts are configured to emit neutrons, and the neutron non-emissive parts do not emit when subject (sic: subjected) to bombardment with particles (see lines 5 and 8-9 of claim 1 and lines 5-6 and 9 of claim 24). Neither is the claimed neutron flow including plural neutron beams coded by the (non-uniform) pattern of the mask (claim 1, lines 14-15 and claim 24, lines 12-13) enabled for the case when the neutron-emissive and non-emissive parts are bombarded with "particles". The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use or practice the invention commensurate in scope with these claims. The Specification has not described and has not shown that neutron emission as claimed occurs as a result of the collective configuration as claimed except for the case when the "particles" are "highly accelerated particles", hence necessarily highly accelerated charged particles, and only for those, - *within the context of the claimed subject matter*, for which a fusion reaction with the tritium or deuterium (through hydrogen) or hydrogen itself in the non-emissive parts is possible, given a sufficiently high ion beam energy; hence only for sufficiently high-energy ions for which the fusion with either deuterium or tritium leading to neutron beams (see line 14 of claim 1 and line 12 of claim 24) due to

the neutrons as reaction products is possible. Practical examples are protons. Deuterium ions, tritium ions,  $^3\text{He}$ -ions,  $^6\text{Li}$ -ions,  $^7\text{Li}$ -ions (see, e.g., Rose and Clark, "Plasmas and Controlled Fusion", M.I.T. Press, Massachusetts Institute of technology and John Wiley & Sons, Inc., New York – London (1961), pages 18-19, while examiner takes official notice that  $^{11}\text{B}$  may be added to the list), and only if the energy of the beam ions is sufficiently high so as to produce a beam of neutrons rather than neutron distributed broadly in velocity space, which is at best true for energies of the order of 10 MeV or higher (see, for example, Davis et al, Plasma Physics and Controlled Fusion volume 50, 065016 (2008), especially Figure 2 and discussion), i.e., that are very large indeed in comparison with what is required to overcome the Coulomb penetration barrier. For the disclosure as contained in the specification, see page 2 and "Description of the Invention" starting at page 4. Although other ions may also be added to the list, for larger nuclei the Coulomb repulsion energy in a nucleus, being proportional to the square  $Z^2$  of the atomic number  $Z$ , outweighs the energy in the nuclear binding forces, which is approximately proportional to  $Z$ , and hence fusion becomes rapidly energetically unfavorable with increasing atomic number (see Blatt and Weisskopf, "Theoretical Nuclear Physics", Dover Edition (1991), pp. 4-5). From this it is clear to one of ordinary skill in the art that the production of neutrons from collisions involving hydrogen (protons, deuterium, tritium) cannot be enabled without restricting the "particles" to ions capable of causing fusion reactions with hydrogen or one of its isotopes (deuterium or tritium) and at sufficient energy to produce neutron beams rather than neutrons isotropically distributed in momentum space. No amount of

experimentation can make up for impossibility, not even an undue amount of experimentation. *A fortiori* it thus can be said that an undue amount of experimentation would be required, - albeit not sufficient, to practice the invention of applicant across its claimed scope. MPEP 2164.01(a).

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. **Claims 1, 2, 5, 8, 10-13, 16, 18-21 and 24** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The metes and bounds of the claimed invention are vague and ill-defined due to the lack of enablement of the scope as defined by the claim language, as noted in the rejection under 35 USC 112, first paragraph, as set forth above in section 3, whereby the claims are rendered indefinite.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1, 2 and 5** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al (JP 63-037621, English abstract) (previously cited) (English translation by translations branch of the U.S. P.T.O. of the entire document is also

herewith enclosed) in view of Watt et al (WO 98/20517) (previously cited). N.B.: The rejection is offered subject to the noted indefiniteness under 35 USC 112, second paragraph, as set forth in section 4, and to the best of examiner's understanding.

*Yamada et al* teach a target (see English abstract, Purpose, lines 1-4) for emitting neutrons when bombarded with high-energy charged particles capable of penetrating a Coulomb barrier, comprising:

a plurality of neutron emissive parts 5 being formed of a hydrogen fixing material within which hydrogen is fixed (said material is boron nitride carbide) (see English abstract), the neutron emissive parts

being configured to emit neutrons when subject to bombardment with particles (when said particle are capable of penetrating deuterium to cause a fusion reaction) because hydrogen contains naturally deuterium, which; and

a plurality of neutron non-emissive parts 4 (gold (Au)) (plating base 4 of gold plating (see English abstract)) which are juxtaposed to the neutron emissive parts and which not being fixed with hydrogen nor with anthropogenic tritium nuclei, the neutron non-emissive parts not being configured to emit neutrons when subject to bombardment with particles,

wherein said plurality of neutron emissive parts being are arranged in relation to the neutron non-emissive parts in the formation of a non-uniform pattern as a coded mask and are collectively configured to emit a neutron flow including plural neutron beams

coded by the pattern of the mask when subject to bombardment with particles (by means of a patterned stencil 5').

When bombarded with charged particles capable of causing fusion reactions and of sufficiently high energy in hydrogen isotopes said target necessarily emits neutrons yielding a neutron flow including plural neutron beams coded by the pattern of the mask (each beam caused by an area of hydride). However, applicant is reminded that the limitations "configured to emit neutrons when bombarded with particles" (lines 1-2) and "such that said target emits a neutron flow including plural neutron beams coded by the pattern of the mask" limit intended use only, and have zero patentable weight for the claimed target except for the capability of the claimed target to perform the intended use. Intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963).

*Yamada et al* do not teach the limitation that said neutron-emissive parts contain anthropogenic tritium. *However, it would have been obvious to include said limitation in view of Watt et al*, who, in a patent document on imparting geometrically complicated structures on a surface (see "Abstract", "Field of the Invention", "Background of the Invention" and "Description of the Embodiments of the Invention", especially col. 5, l. 35-50), hence analogous art with regard to the problem to be solved in a manufacturing process of the coded mask by Yamada et al, namely: how to impart a coded pattern on

a surface, teach the penetration of a tritium beam (a tritium beam inherently being man-made, i.e., anthropogenic) in regions of the surface that form a specified pattern in a resist 1 on said surface (see first two paragraphs of "Description of the Embodiments of the Invention", page 5), creating exposed areas 3 in said resist 1, followed by deposition of a different material in the exposed areas to form microstructures 7 in the metallized substrate with the resist removed (see "Brief Description of the Drawings", pages 4-5). It would have been obvious to include the teaching by Watt et al of the method of better defining the geometrically complicated and small areas in which a different material needs to be deposited also in the invention by Yamada et al because both Watt et al and Yamada et al are concerned with improving the accuracy with which the complicated pattern can be defined (see Yamada et al, English abstract, "Purpose"). In the combined invention some of the tritium unavoidably remains in outside but in the periphery of the exposed area, while the step of electroplating is common among Yamada et al (loc.cit.: "gold plating") and Watt et al ("electroplating" in Watt et al results in electroplated metal 6 and, after polishing/grinding and removal of the remaining resist: microstructures 7: see "Brief Description of the Drawings", especially for Figures 3b and 3c, on pages 4-5). The formation of a layer 5 of the material embodiment as taught by Yamada et al rather than the metal layer 4 of Watt et al is trivial in that only the substitution of a layer of said material embodiment instead of metal layer 4 is required. Therefore, the combination has reasonable expectation of success.

*On claim 2:* the emissive parts in Yamada et al are formed from at least one metal hydride, namely a hydride of the metal boron (N.B.: see Merriam-Webster's Collegiate

Dictionary on boron; page 133), the metal of the metal hydride being located on a support in non-hydrogen fixing material (gold). Whether or not said metal hydride was deposited is of zero patentable weight for the claimed target, being merely a product-by-process limitation. The limitation is only of patentable weight in as much as the method steps distinguish the final structure, and to the extent not impacting final structure are taken to be product-by-process limitations and non-limiting.

A product by process limitation is directed to the product per se, no matter how they are actually made. See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al*, 218 USPQ 289, 292 (Fed. Cir. 1983), and *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make clear that it is the patentability of the final structure of the product "gleaned" from the process steps that must be determined in a "product-by-process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

*On claim 5:* the non-hydrogen material of the support is chosen from among copper, silver or gold, said metals being used alone or in combination: namely: gold (see English abstract, "Purpose").

### ***Response to Arguments***

7. Applicant's arguments filed 12/14/09 have been fully considered but they are not persuasive. In particular, counter to applicant's argument (pages 9-10) that Watt combined with Yamada would not result in having neutron emissive parts *within which*



*hydrogen and anthropogenic tritium nuclei are fixed*, appears to rely on some consequence of fixing the tritium nuclei within the material, given the existence of tritium within said material. But applicant does not state what structural difference is involved. Applicant characterizes the amounts of tritium being left behind after a tritium ion beam is used to pattern a material as "trace amounts". What may be called "trace amount" is quite application-dependent. No specific intensity or range thereof, of the neutron emission, is disclosed; it is upon said intensity that material embodiment requirements depend.

Furthermore, Applicants claim a target, which is equivalent to the claiming of a product, article or apparatus. Not the intended use, nor the making of method, but only the structural properties of the target are of patentable weight. Applicant is reminded that intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963).

Moreover, the lack of disclosing a particular step in the reference(s) of fixing the hydrogen and anthropogenic tritium nuclei (see Remarks, pages 9-10) is only of patentable weight in as much as its structural implications are concerned, in which regard applicant is reminded that the limitation "hydrogen fixing material" followed by a method step, "within which hydrogen and anthropogenic tritium nuclei are fixed", is only of patentable weight in as much as the method step distinguishes the final structure,

and to the extent not impacting final structure are taken to be product-by-process limitations and non-limiting. A product by process claim is directed to the product per se, no matter how they are actually made. See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al*, 218 USPQ 289, 292 (Fed. Cir. 1983), and *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make clear that it is the patentability of the final structure of the product "gleaned" from the process steps that must be determined in a "product-by-process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not. In the underlying case the process step's structural implication is limited to the insertion of hydrogen and anthropogenic tritium into the material.

Applicant's traverse of the rejection relying on a combination of the above references with *Armistead* is persuasive, and hence art rejections for claims 8 and claims 10-13 and 18-21 are withdrawn. Neither is claim 24 rejected over the prior art of record.

Examiner has concluded that the current claim language is only partially enabled by the written description, with reference to the rejection under 35 USC 112, first paragraph, for the reasons.

### ***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHANNES P. MONDT whose telephone number is (571)272-1919. The examiner can normally be reached on 8:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOHANNES P MONDT/  
Primary Examiner, Art Unit 3663